

REMARKS

Claims 1, 3-14, and 16-26 were present in the application and stand rejected. By the foregoing amendments, Claims 1, 14 and 20 have been amended and Claim 19 has been canceled. Claims 1, 3-14, 16-18 and 20-26 are believed to be in condition for allowance in view of the foregoing amendments and following comments. Reconsideration is respectfully requested.

Rejection of Claims Under 35 U.S.C. § 103

The Examiner has newly rejected Claims 1, 3-5, 8, 9, 11, 12, 14, 16-22, 24 and 25 under 35 U.S.C. § 103 as being unpatentable over Block et al. U.S. Patent No. 6,485,765 B1 (newly cited) in view of Ooshima et al. or Helle et al. each taken with Oakes et al. and Kung Jr. et al., and if necessary further in view of taken with Madamwar et al. and Muck (Rejection 1). In addition, the Examiner has newly rejected Claims 13 and 26 under 35 U.S.C. § 103 as being unpatentable over the references as applied in Rejection 1 and further in view of Potter U.S. Patent No. 4,405,609 (newly cited). Further, the Examiner has rejected Claims 10 and 23 under 35 U.S.C. § 103 as being unpatentable over the references as applied in Rejection 1 and further in view of Itagaki et al U.S. Patent No. 4,976,976 (newly cited). These rejections are respectfully traversed.

The invention of applicants' amended claims relates to feed additives and methods for enhancing feed utilization by a ruminant animal by adding to the feed of the animal a feed additive comprising from 0.01 to 1% (w/w) of the dry weight of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive. The feed additives of the invention may be added directly to animal feed in liquid form or may be coated on the surface of a particulate carrier for addition to animal feed. Use of the feed additive of the invention results in increased feed utilization efficiency by the ruminant animal, i.e., a lower

amount of feed required to obtain a given amount of weight gain and/or milk production. As disclosed in the application at page 9, lines 28-33, the inventors determined that the range of concentrations of surfactants that promote association of enzymes with feed particles is quite narrow. Insufficient concentrations of surfactant were found not to increase interaction between enzymes and feed particles, whereas excess amounts tended to mask the surface of the feed particles and impede enzyme attachment.

In rejecting Claims 1, 3-5, 8, 9, 11, 12, 14, 16-22, 24 and 25, the Examiner has relied on Block et al. as disclosing a feedstock for dairy cattle containing macromineral ingredients (citing Column 4, line 11) that may include a surfactant (Column 6, line 46) and an antioxidant (Column 6, lines 39-44). However, Block et al. discloses an entirely different invention from that of the claims of the present invention. In Block et al., the lactational performance of dairy cows is disclosed to be improved by maintaining cations and anions within the feedstock of the cows within a defined ratio. Specifically, the lactational performance of a cow is stated to be improved by feeding a lactating cow a feedstock having a prescribed content of macromineral nutrients; wherein the relative proportions of macrominerals in the feedstock are defined as a dietary cation-anion difference (DCAD) which corresponds to the equation:

$$DCAD = \text{meqM}(\text{Na}^+ + \text{K}^+) - (\text{Cl}^- + \text{SO}_4^{2-}) / 100 \text{ g dietary DM}$$

where meq is milliequivalents, Na is sodium cations, K is potassium cations, Cl is chloride anions, SO₄ is sulfate anions, and DM is dry matter; wherein DCAD has a value between about 20-60 meq/100 g dietary DM, and the atomic ratio of potassium:sodium in the feedstock is between about 1-5:1; and wherein the feedstock has a weight ratio of potassium:magnesium between about 3-5:1.

Thus, the invention of Block et al. relies solely on the control of cation and anion ratios in the feedstock, and Block et al. does not disclose or remotely suggest that the feed utilization

efficiency of ruminant animals could be enhanced by adding to the feed of the animal a feed additive comprising from 0.01 to 1% (w/w) of the dry weight of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive, as required by applicants' amended claims. Although Block et al. suggests at Column 5, lines 41-43, that, "An optional biologically active ingredient can be included in a feedstock in an effective quantity between about 0.05-20 weight percent, based on the weight of feedstock. . ." [emphasis added] that could be a surfactant, or an antioxidant, or one of a long list of other potential optional ingredients (see Column 5, line 47, through Column 6, line 57), there is no remote suggestion that feed utilization efficiency could be increased as claimed in the present application. To the contrary, if surfactants and antioxidants were employed at the relatively high concentrations disclosed by Block et al. (0.05-20 weight percent), a reduction in feed utilization efficiency (see discussion above) and significant intestinal disorders would likely result. Because Block et al. relies entirely on the maintenance of cation and anion levels within a limited range to obtain its desired result, and discloses optional additional ingredients at concentration levels that, while possibly appropriate for ingredients such as sugars, complex carbohydrates, amino acid ingredients, vitamins and protein ingredients, appear to be grossly inappropriate for surfactants and antioxidants, a person of ordinary skill in the art would be led directly away from applicants' claimed invention by a fair reading of the entire disclosure of Block et al. Accordingly, applicants' Claims 1, 3-5, 8, 9, 11, 12, 14, 16-22, 24 and 25 cannot be considered to have been obvious under 35 U.S.C. § 103 over this reference.

None of the other references cited by the Examiner overcome the deficiencies of Block et al. with respect to applicants' claimed invention.

Ooshima et al. discloses the enhancement of enzymatic hydrolysis of cellulose with various surfactants, including Tween 80. This reference does not disclose or remotely suggest

the use of a feed additive comprising from 0.01 to 1% (w/w) of the dry weight of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive, as claimed in applicants' amended claims.

Helle et al. discloses the effects of various surfactants on the heterogeneous enzymatic hydrolysis of cellulose in steam-exploded wood. This reference does not disclose or remotely suggest the use of a feed additive comprising from 0.01 to 1% (w/w) of the dry weight of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive, as claimed in applicants' amended claims.

Oakes et al. discloses administering certain nonionic surfactants to control bloat in ruminants, such as cattle. Oakes et al. does not disclose or suggest the use of a feed additive comprising from 0.01 to 1% (w/w) of the dry weight of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive, as claimed in applicants' amended claims.

Muck and Kung Jr. et al. disclose fermentation reactions in silage production. Neither reference discloses nor remotely suggests the use of a feed additive comprising from 0.01 to 1% (w/w) of the dry weight of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive, as claimed in applicants' amended claims.

Madamwar et al. discloses the use of various surfactants, including Tween 60 and Tween 80, to affect various parameters in the anaerobic digestion profiles of water hyacinth-cattle dung. In the study of Madamwar et al., in vitro, bench-scale anaerobic digesters were fed on a semi-continuous basis with a powdered mixture of water hyacinth and cow dung with the surfactants being added to the sludge. There is no disclosure or remote suggestion in this reference of the use of a feed additive comprising from 0.01 to 1% (w/w) of the dry weight

of the feed of a nonionic surfactant and from 50 to 5000 ppm of an antioxidant based on the surfactant in the feed additive, as claimed in applicants' amended claims.

As set forth above, none of the references cited by the Examiner, alone or in any combination, remotely suggest the invention of applicants' amended claims. Accordingly, it is respectfully submitted that the invention of applicants' amended Claims 1, 3-5, 8, 9, 11, 12, 14, 16-18, 20-22, 24 and 25 would not have been obvious within the meaning of 35 U.S.C. § 103 in view of any combination of these references.

The Examiner has also rejected Claims 13 and 26 under 35 U.S.C. § 103 as being unpatentable over the references as applied in Rejection 1 and further in view of Potter U.S. Patent No. 4,405,609. Claims 13 and 26 related to an embodiment of applicants' invention where the claimed feed additive additionally comprises the digestion enhancing agent monensin. The Examiner has cited Potter as disclosing the addition of monensin to feed to improve efficiency. However, Potter does not overcome the deficiencies of primary references of Rejection 1, discussed in detail above. Since Claims 13 and 26 depend from claims that are now believed to be in condition for allowance as discussed in detail in connection with Rejection 1, above, it is believed that Claims 13 and 26 are also in condition for allowance and that the Examiner's rejection of these claims under 35 U.S.C. § 103 should properly be withdrawn.

The Examiner has also rejected Claims 10 and 23 under 35 U.S.C. § 103 as being unpatentable over the references as applied in Rejection 1 and further in view of Itagaki et al U.S. Patent No. 4,976,976. Claims 10 and 23 related to an embodiment of applicants' invention where the claimed feed additive is coated on a particulate carrier, and the particulate carrier is selected from the group consisting of celite, diatomaceous earth and silica. The Examiner has cited Itagaki et al as disclosing silica or diatomaceous earth in a feed additive. However, Itagaki et al does not overcome the deficiencies of primary references of Rejection 1, discussed in detail

above. Since Claims 10 and 23 depend from claims that are now believed to be in condition for allowance as discussed in detail in connection with Rejection 1, above, it is believed that Claims 10 and 23 are also in condition for allowance and that the Examiner's rejection of these claims under 35 U.S.C. § 103 should properly be withdrawn.

Obviousness-Type Double Patenting

The Examiner has rejected original Claims 1, 3-5, 8-12, 14 and 16-25 on the ground of nonstatutory obviousness-type double patenting over Claims 1-10 of U.S. Patent No. 6,221,381 in view of Block et al.

The Examiner has further rejected original Claims 13 and 16 on the ground of nonstatutory obviousness-type double patenting over Claims 1-10 of U.S. Patent No. 6,221,381 in view of Block et al., and further in view of Potter.

As set forth previously, the invention of applicants' amended claims is related to that of U.S. Patent No. 6,221,381, but is distinguished therefrom by requiring the presence of both a nonionic surfactant and an antioxidant agent at the recited concentrations in the claimed feed additive and methods. The requirement of an antioxidant agent in the amended claims of the present application would not have been obvious over the claims of the '381 patent in view of the discussion of the deficiencies in the disclosure of Block et al. as set forth in detail above in connection with Rejection 1, and it is believed that the Examiner's rejection of claims on this basis should properly be withdrawn.

Conclusion

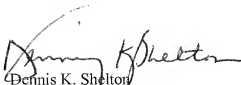
In view of the foregoing amendments and comments, it is believed that amended Claims 1, 3-14, 16-18 and 20-26 are in condition for allowance. Reconsideration and favorable action are requested. The Examiner is further requested to contact the applicants' representative

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at the number set forth below to discuss any issues that may facilitate prosecution of this application.

Respectfully submitted,

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A handwritten signature in dark ink, appearing to read "Dennis K. Shelton", is written over the printed name.

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